

STUDIES ON BIODIVERSITY OF PHARMACEUTICALLY AND COMMERCIALY IMPORTANT SEAWEEDS OF GRACILARIEACEAE FROM GULF OF MANNAR COASTAL REGIONS, TAMIL NADU, INDIA

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ABSTRACT

Marine Algal seaweeds are found in the coastline between high and low tide, and in the subtidal region up to a depth where 0.01% photosynthetic light is available. Algal seaweeds pigments types and concentrations, light intensity, exposure and depth, temperature, tides and the characteristics of the shore combine to create different environments that determine the distribution and variety of seaweeds. The present study was conducted at Gulf of Mannar coastal regions, Tamil Nadu, India, formed of different inter-tidal rocky shores with rich algal vegetation. A total of 9 species of seaweeds of Gracilariaceae were recorded in this present work. Among them, *Gracilaria corticata* and *Gracilaria pygmaea* were present throughout the study period. The *Gracilaria fergusonii*, *Gracilaria foliifera*, *G.edulis*, *G.crassa*, *G. stolonifera*, *G. idinthakaraiensis* and *G. rostrata* were seasonal dependences.

KEYWORDS: Gracilariaceae, *Gracilaria*, *corticata*, *pygmaea*, *fergusonii*, *foliifera*, *edulis*, *crassa*, *stolonifera*, *idinthakaraiensis*, *rostrata*.

INTRODUCTION

There are different forms of living beings, starting from unicell to multicell nature. It has been believed that the first living cell that appeared on the living planet emerged from the ocean. In all its structures, Life has had developed from the initial growth of mono-cellular algae.^[1] It was measured that 90% of the species of marine greens are algae and nearly 40% of the global photosynthesis has donated from algae.^[2] Marine algae are an indispensable part of coastal environments or coastline ecosystems and provide invaluable ecosystem services

for supporting the many marine life forms. The economic importance of algal seaweeds is highly supported and contributes to the sustainable growth and development of rural coastal regions. Seaweeds are food in some Asian countries and also producing the high-value compounds such as phycocolloids which has been widespread across the globe with an estimated value of more than one billion US\$. They are being used for the production of plant growth stimulants for agricultural applications.^[3]

Seaweeds are also known as macroalgae and are among the most important primary producers. The marine organisms are being depended on the seaweeds, which are the main primary producers, shelter, nursery grounds and food sources. Seaweeds are the best economic value and the highest ecological importance. Seaweeds thalli are being used as biofertilizers, animal and human food sources. The extracted seaweed substances are used as stiffeners and stabilizers in the food manufacturing industries, cosmetics, pharmaceutical industry, biotechnology applications^[4,5], bio-fuel, nutraceutical, medicinal, personal care and food additive industries.^[6,7] Currently, the field of medicine has developed with bioactive molecules extracted from seaweeds.^[8,9] Moreover, seaweeds are relatively easy to observe, manipulate and measure. Therefore, they have been widely applicable to use as model organisms for testing different ecological theories and for studying biogeographic patterns, both in subtidal and intertidal habitats.^[10-12]

India has more than 7000 km of a vast coastline in which, a large diversity of marine algal species.^[13] The Indian seaweeds are highly divergent tropical species with boreal, temperate and subtropical elements. Rao and Mantri^[14] reported that many of the rocky beaches, estuaries, mudflats, coral reefs and lagoons along the Indian coast provide ideal habitats for the growth of seaweeds (rich seaweed beds occur around Visakhapatnam in the eastern coast, Mahabalipuram, Gulf of Mannar, Tiruchendur, Tuticorin, Kanyakumari and Kerala in the southern coast; Veraval and Gulf of Kutch in the western coast; Andaman and Nicobar Islands and Lakshadweep.^[15-22]

Southeast coast of Tamil Nadu, India has a unique marine habitat occurred with diverse seaweeds. Recently, less number of investigations has been carried out on different applications and uses of marine macroalgae in Mandapam, Ramanathapuram district.^[23-25] Moreover, research studies on various aspects of macroalgae are still in need, especially, on biodiversity. Such information could provide a baseline for future more complex ecological studies and coastal management, as well as applied aspects of the uses of seaweed. Therefore,

the present study was initiated to explore the richness of seaweeds in Mandapam coastal waters of the southeast coast of India.

The genus *Gracilaria* is cosmopolitan in distribution and has been reported from the arctic, temperate and tropical regions. Greville named the genus *Gracilaria* in 1830, including four species. Kylin^[26] formed the family Gracilariaceae under the order Gigartinales with their characteristic feature of a large fusion cell formed after fertilization.^[27] Agardh^[28] reexamined the genus and included 23 species under it. Since then, studies in various parts of the world have led to the inclusion of about 320 species under this genus, of which 169 species have been accepted taxonomically.^[29]

In India, the genus *Gracilaria* has 32 species, of which about 31 are found in different locations of Tamilnadu coast regions alone.^[30] After that, there were three new species of the genus *Gracilaria* (*G. stolonifera*, *G. idinthakaraiensis* and *G. rostrata*) reported from the Tamilnadu coastline regions and the genus currently has 35 species.^[31] During the seaweed collection and selection from the southeast coast of Tamil Nadu, the authors happened to collect a specimen of a species of this genus from Mandapam coastal regions, Tamil Nadu. On critical examination, it was identified as *G. idinthakaraiensis* by Umamaheshwara Rao.^[31] Till date, this species has been recorded only from the type localities. A perusal of literature does not reveal any of the earlier floristic research works elsewhere in details.^[18,22]

MATERIALS AND METHODS

The present study was carried out at Tamil Nadu coast in the southeast coast of India. Tamil Nadu coasts a beautiful and tidy with rocky shores showing astonishing biodiversity. Rocks are at sides of the beach give it a pristine look and the excellent areas for tourists to enjoy its beauty.

Field surveys were undertaken in the selected sampling stations of the Tamil Nadu coast over twelve months from January to December 2016. The algal samples were collected in every season during the study period by detaching a portion from the seaweed bed, keeping it in polythene bags with fresh seawater, transporting to the laboratory and fixing in 4% formaldehyde for further studies. Srinivasan^[32,33] identified the seaweeds by using the taxonomic keys and the nomenclature was updated.^[29,34]

RESULTS AND DISCUSSION

Total numbers of nine taxa are belonging to Rhodophyta – Gracilariaceae family. The seaweeds are observed in the present study are similar to those reported from the earlier report in other coastal regions of Ramanathapuram district coastal regions, Tamil Nadu, India^[22]; and the very high richness of seaweeds species in four districts of Tamil Nadu coastal waters may be due to the presence of intertidal rocky reefs.

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